

ABSTRACT OF THE DISCLOSURE

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5 A control valve includes a magnetic pole member. An armature is slidably supported relative to the magnetic pole member for movement between a fully open position and a closed position. A biasing spring is disposed between the magnetic pole member and the armature for forcing the armature away from the magnetic pole member. A coil is placed about the magnetic pole member and the armature for inducing a magnetic field for moving the armature toward the magnetic pole member. One of either of the magnetic pole member or the armature has a recess for non-contactingly receiving the other when the armature moves between the fully open and closed positions. The control valve can be embodied as a normally open valve or a normally closed valve. The use of dual lateral poles and triple lateral poles create a flat magnetic force versus travel curve thereby allowing for greater proportional control of the valve. Additionally, the use of double lateral gaps and triple lateral gaps respectively results in force increases of 21% and 12% respectively. Compounding the force increases results in a net additional force of 36%.

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